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Evidence of magnetic clusters in the disordered ferromagnet Ni-V close to the quantum critical concentration RUIZHE WANG, S. UBAID-KASSIS, A. SCHROEDER, Kent State University, Kent, OH, P.J. BAKER, F.L. PRATT, ISIS Facility, U.K., S.J. BLUNDELL, T. LANCASTER[1], I. FRANKE, J.S. MOELLER[2], Univerisity of Oxford, U.K., T. VOJTA, Missouri University of S & T, Rolla, MO — We report the results of muon spin relaxation (μSR) experiments in zero field (ZF) and transverse field (TF) as well as magnetization (M) data of $Ni_{1-x}V_x$ close to the critical vanadium concentration $x_c \approx 11.6\%$ where the onset of the ferromagnetic (FM) order is suppressed. This material features a prototypical disordered quantum phase transition (QPT) as seen in the temperature (T) and magnetic field (H) dependence of $M(H,T)$. In the paramagnetic phase (PM) above x_c, $M(H,T)$ is well described by non-universal power laws characterized by an exponent $\alpha(x - x_c)$, establishing a quantum Griffiths phase. Here, we focus on the FM side of the QPT below x_c. After subtracting the spontaneous magnetization M_0, we find that $M(H,T) - M_0$ also follows a power law in H at low T with an analogous non-universal exponent $\alpha(x_c - x)$. This is the first evidence of a quantum Griffiths phase within the FM phase in this disordered alloy. μSR in ZF recognized a broad field distribution below x_c as evidence of magnetic spatial inhomogeneities in the FM phase. Different muon depolarization rates in TF and ZF reveal magnetic clusters already in the PM regime. These observed clusters are important generic ingredients of a disordered QPT.

[1]current: Durham University, U.K.
[2]current: ETH Zurich, CH

Ruizhe Wang
Kent State University, Kent, OH

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